DOCUMENT RESUME

ED 130 787 PS 008 929

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TITLE Inhibitive Capability in Young Children: Stability and Development.
PUB DATE Sep 76
NOTE 22p.; Preliminary report of this paper presented at the Annual Meeting of the American Psychological Association (84th, Washington, D.C., September 3-7, 1976)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Age Differences; *Behavior; Child Development; Delay of Gratification; Experimenter Characteristics; *Infants; *Inhibition; *Preschool Children; *Preschool Education; Punishment; Research; *Self Control; Sex Differences; *Social Development

ABSTRACT

This study was designed to gather data on the developmental progression of children's inhibitive capabilities in a naturalistic setting and to determine the stability of observed capabilities within a developmental period. One hundred and twenty-two 2-, 3- and 4-year-old children were given an opportunity to select an attractive toy and play with it for a short period, then ordered by an adult to stop playing with the toy. Three classes of inhibitive behavior were recorded: initial inhibition, short-term continued inhibition, and long-term continued inhibition (remaining stopped for 30 to 60 seconds, respectively). A second session three weeks following the first (with a different adult) assessed the stability of observed inhibitive behaviors. The proportions of children showing initial inhibition rose significantly with age, ranging from 43% of 2-year-olds to 77% of 4-year-olds. The stability of initial inhibition across experimental sessions also rose with age. The proportions of children showing continued inhibition also rose with age, but for long-term continued inhibition the presence of a female adult significantly reduced the proportion of older children demonstrating it. The results are discussed in terms of different processes mediating initial inhibition and continued inhibition during a delay period. (Author/MS)

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Inhibitive Capability in Young Children: Stability and Development

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Running head: Inhibition in Young Children

PS 008929

Abstract

An experiment is presented that was intended to describe the developmental progression of children's inhibitive capabilities in a naturalistic setting and to determine the stability of observed capabilities within a developmental period. Young children two, three, or four years of age were given the opportunity to select an attractive toy, to play with it for a short period, and were then commanded by an adult to cease playing with the toy. Three classes of inhibitive behavior were recorded: initial inhibition, short-term continued inhibition, and long-term continued inhibition (remaining stopped for 30 and 60 seconds, respectively). A second session three weeks following the first with a different adult assessed the stability of observed inhibitive behaviors. The proportions of children showing initial inhibition rose significantly with age, ranging from 43% of two-year-olds to 77% of four-year-olds. The stability of initial inhibition across experimental sessions also rose with age. The proportions of children showing continued inhibition also rose with age, but for long-term continued inhibition the presence of a female adult significantly reduced the proportion of older children demonstrating it. The results are discussed in terms of different processes mediating initial inhibition and continued inhibition during a delay period.

Inhibitive Capability in Young Children: Stability and Development

The capability of very young children to terminate and thus inhibit an ongoing motor activity has been much maligned. Luria (1969), for example, has referred explicitly to ". . . the impossibility of inhibiting motor reactions in the two- to two and one-half-year-old child. . .," proposing that an external, verbal command to stop may actually serve as an initiating stimulus for the perseveration of that motor activity. Empirical research following Luria's work has generally been concerned with the self-regulating mechanisms available to young children, especially insofar as self-verbalizations may be utilized to that end (e.g., Bem, 1967; Lovaas, 1964; Meichenbaum & Goodman, 1969a, b; Miller, Shelton & Flavell, 1970). This research has proceeded despite an absence of normative, descriptive data on children's capabilities to exhibit inhibitive self-control upon an external request, and its contribution to an understanding of spontaneously occurring self-regulation in response to natural environmental pressures such as the limitations imposed by socialization agents or peers. The apparent assumption has also been made that a given child's capability for self-regulation is stable within a developmental period so that a child may be classified as in a given "stage" or with an epithet such as "reflective" or "impulsive." While this assumption may be reasonable, and fits with informal observations of consistency in the general class of inhibition-related behaviors, there has as yet been no assessment of the temporal stability or reliability of young children's capability or incapability to regulate their social or motor

behaviors in an inhibitive fashion, either in response to an external command or with the assistance of verbal self-regulatory responses. Such information is particularly important if inhibition is to be interpreted within an ability or capability framework.

Problems also exist with the type of activities used in previous research because of severe limitations in the ecological validity of tasks employed and a consequent curtailment of the generalizability for observed behavior capabilities. Experimental tasks have often consisted of very simple motor repetitive responses (e.g., squeezing balls or balloons) or of paper and pencil cognitive tasks (e.g., the Porteus maze) rather than the spontaneous and persistent manipulation of valued objects such as toys or social activities such as involvement in games. Although there have been a few studies employing more naturalistic stimuli, such as toys (e.g., Hartig & Kanfer, 1973), these experiments tended to involve resistance to temptation in a delay of gratification format and not children's capabilities for terminating ongoing behavior.

Finally, in the general literature on the self-regulation of behavior, while there has been a recognition that inhibition, resistance to deviation or temptation, and delay of gratification are conceptually differentiable, there has been little in the way of an attempt to formalize differences among these classes of behavior or to examine their relations to one another. Inhibition is typically characterized as an ability or capability, something which one may attempt and either succeed or fail at (Luria, 1969; Meichenbaum & Goodman, 1969a, b). Resistance to temptation and delay of gratification have also been conceptualized in an abilities framework (Freud, 1911, for example), but most research has been intended to highlight the contextual, socialization, and cognitive factors influencing children's presumably voluntary tendencies to display resistance or delay behavior (e.g., Parke, 1974; Mischel, 1974).

The present study was designed to gather developmental data on the frequency and stability of young children's capability to cease playing with an attractive toy when asked to do so by an adult and on their ability to continue such inhibition during a delay period. Descriptive data included the proportions of children of each sex at each age who were able to responsively inhibit playing when commanded to do so by an adult. Measures included whether a child was able to stop the enjoyable activity immediately upon command, whether s/he was able to continue refraining from resuming play for 30 seconds, and whether s/he was able to continue refraining from resuming play for a full minute. The initial measure was considered to be primarily indicative of inhibitive capability, while the latter two were seen to be progressively more influenced by factors related to delay of gratification processes and behavioral tendencies towards obedience. Two different adults of each sex served as experimenters, and stability was assessed by means of a second experimental session, three weeks following the first, which was conducted by a different experimenter of the same sex as the one administering the first session. Two-, three-, and four-year-old children participated as subjects. It was predicted that inhibitive capability would increase across age. An age increase was also expected in avoidance of play resumption measures, but it was not expected that the changes observed would be as regular or consistent as for the inhibition measure due to the additional variance from individual differences in socialization experiences related to delay of gratification and obedience. Factors such as a child's sex or the sex of the experimenter with whom s/he interacted were not expected to affect inhibition since they are likely to summarize socialization experiences unrelated to inhibition as an ability variable. However, it was expected that measures of continued inhibition during the delay period might be affected by

such factors. The primary variable of interest was the sex of experimenter since past research had indicated that female experimenters tended to produce higher levels of self-gratification behavior in children than did male ones (Masters, 1971a, b), presumably because children perceived an increased nurturant tolerance for such behavior, and other data (Bandura, Grusec & Menlove, 1967) indicated that as models, nurturant adults incline children to a reduced adoption of reinforcement standards that would lower the amount of self-reinforcement in which they could engage.

Method

Subjects. One hundred twenty-two preschool children from nursery schools in a large metropolitan area served as subjects. There were 37 two-year-olds (M age = 31.3 months), 41 three-year-olds (M age = 43.6 months), and 44 four-year-olds (M age = 54.2 months). Data collection continued until the smallest N for a cell (Age of S x Sex of S x Sex of E) containing both children who inhibited and children who did not was > 5.

Procedure. To assess the short term stability of observed inhibitive capabilities, children participated in two experimental sessions. The second session was conducted a minimum of three weeks following the first, and always involved a different experimenter who was the same sex as the one the child had met initially. For both experimental sessions, children were brought to the experimental room by the experimenter and shown a set of nine toys (accordian, ball, binoculars, camera, radio, Slinky, tinkertoys, top, xylophone). Children were given a short time to inspect the toys and to select the one they found most attractive. After selecting a toy, a child played with it for a period of two minutes while the experimenter read a book and was uninvolved with the child. The adult then looked up, commanded the child to stop by simply but

assertively saying, "Stop playing with the _____," and turned his attention back to the book.[2] For one minute thereafter, the experimenter did not interact with the child and the following data were recorded: whether the child ceased playing at the adult's command (within 5 seconds), if s/he failed to resume after 30 seconds, and if s/he had failed to resume after 60 seconds. Following this, there was a buffer period during which the remaining toys from the selection array were reintroduced and the child was given access to all of them for a two-minute period.

Results

Developmental analyses. Children were classified according to three definitions of inhibitive activity: initial inhibition, if they ceased playing within 5 seconds after being commanded to do so; short-term continued inhibition (30 sec.) if they showed inhibition and continued to avoid playing for 30 seconds following the command; and long-term continued inhibition (60 sec.) if they showed inhibition and continued to avoid playing for 60 seconds following the command to stop.

Figure 1 presents the proportions of children at each age who demonstrated

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Insert Figure 1 about here

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the various classifications of inhibition and continued restraint. These data were subjected to a sex of child X sex of experimenter X age analysis of variance for each classification. Regardless of classification, there was a significant and orderly progression within each age showing an increase in the proportion of children showing inhibition with increasing age (F = 5.73, 11.51, and 6.33, 2/110, $p < .01$ for classifications of inhibition, 30-sec., and 60-sec., respectively). Consistently, the largest progression in exhibited inhibition occurred between the third and fourth years. Individual comparisons (Dunn's Multiple Comparison Test) revealed that for each classification, in every instance

but one, the increase from both ages 2 to 3 and from 3 to 4 were highly significant (all $p < .05$ or better). The only exception to the pattern of increasing inhibitive capability with age was a decline at age 4 in the proportion of children showing continued restraint following inhibition for the full 60-second period. This seemingly anomalous result is qualified by a finding reported below.

The overall analyses revealed no significant effects due to sex of child or sex of experimenter, and these variables entered into no significant interactions. However, since it had been anticipated that classifications involving extended delay of gratification periods where inhibition had to be maintained over a period of time might be affected by factors other than inhibitive capability, certain follow-up analyses were conducted. Specifically, sex of subject X sex of experimenter analyses were conducted for the various classifications at each age since it was anticipated that either the experimenter's sex or an interaction between the experimenter's sex and the sex of the child would summarize socialization factors that might affect the maintenance of a resistance to engage in the attractive activity which was required for continuing inhibitive control. These analyses revealed a significantly lower proportion of children of both sexes showing 60-sec. inhibitive control for female experimenters (26.55%), than for a male experimenter (65.58%) ($F = 6.32$, 1/40, $p < .02$). The results for the male experimenter are thus in line with the developmental progressions shown within the other categories between ages 3 and 4.

Temporal stability analyses. The stability data are presented in Tables 1 and 2. For children whose inhibition and continued control behavior was successful at the first assessment (Table 1), consistently large proportions behaved in similar fashion nearly a month later in the presence of a different

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Insert Table 1 about here

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adult. The minimum proportion of children showing stability was consistently found in the youngest age group, but it was still nearly 70% at the very lowest. The developmental increase in stability of inhibitive control during the 30- and 60-sec. periods failed to reach significance ($\underline{X}^2$ = 1.72 and 1.93, $\underline{df}$ = 2, for the two groups respectively), but there was a significant tendency for older children to show progressively greater stability in their performance of simple inhibition ($\underline{X}^2$ = 13.59, $\underline{df}$ = 2, $\underline{p}$ < .01).

Despite the fact that the developmental data indicated that development proceeded towards increased inhibitive capability and the tendency for continued inhibitive control during a delay period, the stability of children's non-inhibitive behavior was also quite high (Table 2). It should be noted that

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Insert Table 2 about here

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instability indicates developmental progression for these data. These data on inhibition are characterized by a developmental progression in which instability is present to some degree at the youngest age but totally absent at older ages where children who continue to show no inhibition have little likelihood of progressing during a month test-retest period, as if their noninhibitive behavior is more fixated than that of younger children. However, largely due to the low N's for this analysis, this observed tendency failed to reach significance ($\underline{X}^2$ = 2.93, $\underline{df}$ = 2, $\underline{ns}$). For classifications involving the continuation of inhibitive control during a delay period, a different picture emerges and the only instability observed occurred for four-year-old children. For these data there was a nonsignificant tendency for greater instability among four-year-olds for the 30-sec. classification ($\underline{X}^2$ = 3.39, $\underline{df}$ = 2, $\underline{p}$ < .20) and a marginally significant tendency for greater instability among four-year-olds for the 60-sec. classification ($\underline{X}^2$ = 5.39, $\underline{df}$ = 2, $\underline{p}$ < .06).

Discussion

In addition to the conceptual rationales for the current study, there was a methodological one as well: to establish an inhibition task which would be applicable to preschool children across a small age range, which had ecological validity, and on which neither ceiling or floor effects would characterize the proportions of children showing inhibition at a given age. The latter was particularly important since such a task, if developed, would be appropriate for the subsequent study of factors which enhance and reduce children's inhibitive capabilities and tendencies to continue inhibition across a delay period at different ages. While Luria's (1969) generalizations involving motor inhibition in two-year-olds would lead to the conclusion that such a task could not be found, at least not for the youngest subjects, the present data indicate quite clearly that this goal was in fact achieved. In addition to revealing significant developmental trends in inhibitive capabilities, the smallest proportion of children at a given age showing either initial or continued inhibition was 19%, and the highest proportion observed was 77%.

The present data revealed a very clear developmental curve of increasing inhibitive capabilities with age. The path of development begins at least as early as age two, and the sharpest increase occurred between two and three years of age. Despite the observed developmental trend, children's inhibitive capability proved to be remarkably stable across a reasonable period of time, and across social agents. The stability findings for each age studied, however, are compatible with the natural conflict between stability and development such that the variable of stability itself had a developmental picture: older children showed higher stability for inhibition but lower stability for non-inhibition, reflecting the natural history of developmental change in otherwise

stable behavior patterns. A short-term longitudinal study would be particularly helpful in confirming this interpretation. In such an experiment it would be predicted that all children, even the youngest, who showed inhibition at a first assessment would continue to do so and thus exhibit no development at all, while children who did not initially demonstrate inhibition would eventually do so and be consistent thereafter.

It was argued here that initial inhibition and subsequent resistance to resuming the inhibitive activity comprise different facets of children's inhibitive capabilities. In line with expectations, it was found that the stability as well as the developmental course of these different types of behavior diverged in understandable ways. The developmental course of children's tendencies to maintain inhibition during a delay period paralleled that of initial inhibition, but for older children the sex of the person giving the inhibition command modified tendencies to maintain inhibition over a longer period of time. While the capability for initial inhibition became significantly more stable for older children, this was not the case for continued inhibition. Finally, there was a tendency for the exhibition of continued inhibition during a delay period which was absent in oldest children during an initial assessment to be present at a second assessment, indicating either instability or developmental progression; such change was not significant for the initial inhibition measure, and the instability that was observed occurred among only the youngest children, not among the oldest. Earlier it was argued that the measures of continued inhibition would be more likely to contain elements of resistance to deviation or delay of gratification mechanisms. This initial demonstration that initial and continued inhibition have different patterns of stability, development, and responsivity to contextual factors forms a foundation for the

related investigation of factors likely to influence delay or compliance behaviors in addition to those relevant to motor inhibition. The present findings do not conclusively demonstrate an ability foundation for initial inhibition, but the picture of smooth development and increasing stability are compatible with that interpretation and provide some minor construct validation. At the very least, these results argue for the continued assessment of both initial inhibition and continued inhibition during a delay period as separate measures of different types of inhibition-related behaviors.

A reasonable proportion of very young children obviously <u>can</u> inhibit motor behavior when commanded to do so, even though it appears that they are likely to become more able to do so with increasing age. The important question very clearly is not whether young children can inhibit motor behavior but rather what the factors are influencing the development of that ability. The relation of contextual, socialization, and cognitive factors on the initiation and continuation of motor inhibition comprise a large set of important questions that are now appropriate for investigation. For example, the attractiveness of an object to be relinquished or activity to be stopped is likely to affect both initial inhibition and continued self-restraint, providing a contextual determinant of various inhibition-related behaviors such as those examined in the present experiment. The instigation to inhibition, in the case of commands by external agents, may have differential effectiveness as a function of the socialization techniques with which it is delivered and the social learning principles from which they derive their effectiveness. For example, the promise of a reward or punishment for obeying a command to stop an activity might enhance the effectiveness of the command or interfere with its effectiveness should accompanying arousal due to the anticipation of reward or punishment interfere

with effective self-control. Any effectiveness of promised reward or threatened punishment may be due to simple learning processes or to the capability of such communications to distract a child from the attractive stimulus or activity at hand, thus providing a cognitive-anticipatory mechanism for self-control.

Finally, the cognitive mechanisms available to children for self regulation, already under study in the related areas such as delay of gratification, are certainly likely to have regulatory effects regarding motor inhibition in a social context. Plans to inhibit (e.g., Patterson & Mischel, 1976), for example, should exercise control over both initial and continued inhibition, as should symbolic transformations that alter the attractiveness of the activity being inhibited (Mischel, Ebbesen & Zeiss, 1972; Moore, Note 1), while mechanisms involving techniques of self distraction (Mischel & Ebbesen, 1970; Mischel et al., 1972) may be effective only after inhibition has been successfully initiated. Clearly, the questions that may be raised regarding factors controlling children's inhibitive behavior are numerous and of keen importance for understanding inhibition and its development.

Reference Notes

1. Moore, B. S. Cognitive representation of rewards in delay of gratification. Paper presented at the 84th Annual Convention of the American Psychological Association, 1976.

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Footnotes

[1]A preliminary report of these data was made at the 84th Annual Convention of the American Psychological Association, Washington, D. C., 1976. Author Masters' address: Institute of Child Development, University of Minnesota, Minneapolis, Minnesota 55455.

[2]While one might argue that obedience is also a behavioral variable relating to both inhibitive and delay of gratification/resistance to deviation capabilities, steps were taken in the present experiment to minimize any role obedience might play in children's behavior. The experimenters were all adults, and they were not of longstanding familiarity with the children since obedience studies have shown that familiarity tends to reduce obedience (Carlsmith & Lepper, 1974; Landauer, Carlsmith & Lepper, 1970). The inhibition command was given clearly and assertively, and did not merely constitute a request. It was fully anticipated from the outset that obedience might play a role in the performance of continued inhibition, and this fact was recognized in the predictions tendered for that class of inhibitive behavior.

Table 1

Stability I: Consistency of Initial and Continued Inhibition Across Two Sessions

Measure	Behavior During Each Experimental Session		Age		
	Session I	Session II	2	3	4
INITIAL INHIBITION					
	Inhibited	Inhibited	68.75%	89.66%	97.06%
		Did not inhibit	31.25%	10.34%	2.94%
	(Overall N's)		(16)	(29)	(34)
CONTINUED INHIBITION: 30 sec.					
	Avoided Resumption	Avoided Resumption	75.00%	88.00%	93.33%
		Did not avoid Resumption	25.00%	12.00%	6.67%
	(Overall N's)		(8)	(25)	(30)
CONTINUED INHIBITION: 60 sec.					
	Avoided Resumption	Avoided Resumption	71.42%	86.95%	89.47%
		Did not avoid Resumption	28.57%	13.05%	10.53%
	(Overall N's)		(7)	(23)	(19)

Table 2

Stability II: Consistency of Failure at Initial and Continued Inhibition Across Two Sessions

Measure	Behavior During Each Experimental Session		Age		
	Session I	Session II	2	3	4
INITIAL INHIBITION					
		Inhibited	14.29%	0%	0%
	Did not inhibit				
		Did not inhibit	85.71%	100%	100%
	(Overall N's)		(21)	(12)	(10)
CONTINUED INHIBITION: 30 sec.					
		Avoided Resumption	0%	0%	7.14%
	Did not avoid Resumption				
		Did not avoid Resumption	100%	100%	92.86%
	(Overall N's)		(29)	(16)	(14)
CONTINUED INHIBITION: 60 sec.					
		Avoided Resumption	0%	0%	12.00%
	Did not avoid Resumption				
		Did not avoid Resumption	100%	100%	88.00%
	(Overall N's)		(30)	(18)	(25)

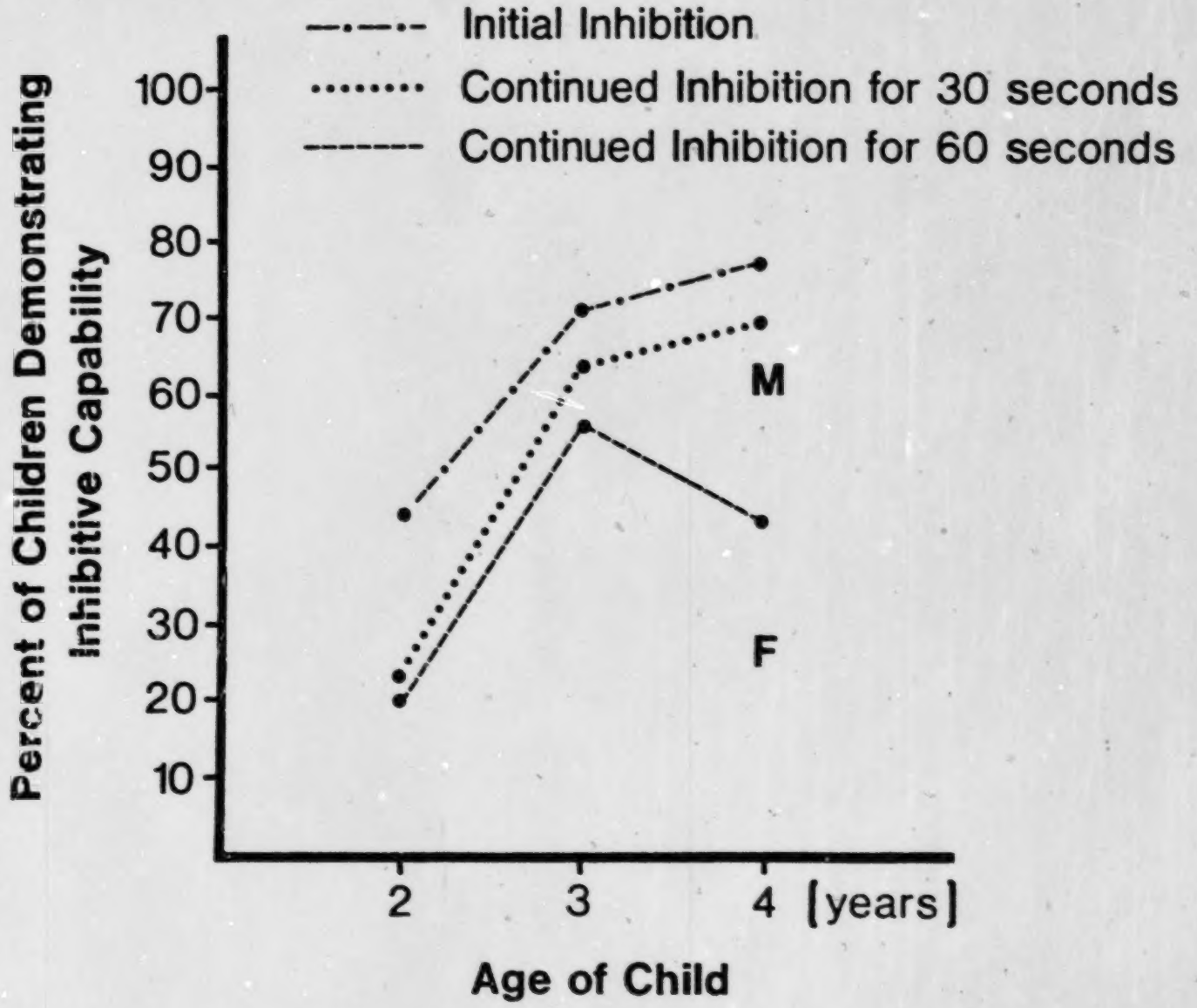
Initial Inhibition
Continued Inhibition for 30 seconds
Continued Inhibition for 60 seconds
Percent of Children Demonstrating Inhibitive Capability
100
90
80
70
60
50
40
30
20
10
M
F
2
3
4 [years]
Age of Child

Figure Caption

Figure 1. Percent of children at each age demonstrating inhibitive capability according to the various criteria. The M and F refer to the mean proportions avoiding resumption for 60 seconds after command by Male (M) or Female (F) experimenter.